



SnowNews

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2018 Snow School capitalizes on record-high Montana snowpack

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So far this year, the state of Montana is leading the pack. Literally. Several mountain sites in Montana are measuring record-high levels of snowpack this season, unlike most other western states. And it just so happens that this year's Westwide Snow Survey Training landed in West Yellowstone, Montana. There was plenty of snow on the ground for students to work, train and play in.

This annual training course, dubbed "Snow School," is a culmination of snow science and snow safety skills and awareness. Topics include snow sampling methods, snow science, mountain medicine, wilderness survival, snow shelter construction, avalanche awareness and rescue, and snowmobile operation and maintenance.

The course is offered to snow surveyors who collect snowpack data at hundreds of sites across 12 western states, including Alaska. As part of its Snow Survey and Water Supply Forecasting program, the USDA Natural Resources Conservation Service (NRCS) operates and maintains an extensive network of automated snow telemetry (SNOTEL) sites and manual snow courses throughout the West. The data collected at those sites are used by the

NRCS National Water and Climate Center (NWCC) to generate a variety of forecasting products—including detailed streamflow forecasts for the spring and summer.

Because the vast majority of the water supply in the West comes from snowmelt, these forecasts are critical in helping agricultural producers and communities plan ahead and make informed decisions related to their spring and summer water supply. Although the forecasts are primarily produced for agricultural use to help farmers, ranchers and irrigators plan their water use, a variety of other stakeholders rely on these forecasts for operating

hydropower generation, reservoir management, fish habitats, and outdoor recreation.

Most Snow School students are employed by NRCS, however the training also is available to cooperating partners from other federal and state agencies, power generation organizations, public utilities, and Native American tribes who conduct snow surveys. For example, this year's class included cooperating surveyors with the Navajo Nation, the Salt River Project in Arizona and the California-based Kings River Water Association.

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Students learn how to measure snow water equivalent (the amount of water stored in the snowpack) using a federal sampler at the 2018 Westwide Snow Survey Training in West Yellowstone, Montana. Photo by Tracy Robillard.

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2018 Snow School highlights

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“Science and safety training supports NRCS’s critical water supply forecasting mission”

The information taught at snow school is critical to help snow surveyors do their jobs, especially in the event of an emergency. Many snow sites are in remote wilderness areas and can only be accessed by helicopter or a snowmobile.

There's always a risk of severe weather, equipment malfunctions, injuries or medical emergencies that may require surveyors to survive in below zero temperatures and await rescue.

“One major purpose of the course is to teach how to survive and return from extreme conditions and to deal with potentially difficult situations,” said NWCC Director Dr. Michael Strobel. “Doing the best science is our goal, but our most valuable asset is our people and their wellbeing.”

Eric Larson, a hydrologist with NRCS Montana, has had several close calls in the wilderness where he has mentally prepared himself for the survival techniques taught at Snow

School. For example, last fall a remote SNOTEL site was burned in a wildfire. He needed to repair some equipment at the site to get the station back up and running. Because it's only accessible by helicopter, they had to monitor weather forecasts closely and find a safe window of opportunity to do the repairs.

“We were trying to get there all winter, but the weather wasn't safe,” Eric said. “We finally found a day where we could fly into the site. It was -5 degrees that day, but clear enough to get in.”

“About two hours into the repairs, the helicopter pilot said we had to go. A storm was rolling in and we needed to get out. But then the helicopter wouldn't start. We sat there for 45 minutes trying to get the helicopter going. I was preparing myself for the possibility that we would have to spend the night out there.”

Fortunately, the pilot was able to start the helicopter using

some extra battery packs, and they made it safely out. But incidents like this leave a lasting impression on snow surveyors like Eric and reinforce the need to always be prepared for emergencies.

[Flickr Photo Gallery:](#)
[2018 Snow School](#)

Lucas Moore is a hydrographer with Kings River Water Association who attended Snow School this year. He recalled a survival scenario that affected surveyors in California last year. A helicopter crew had to spend the night in -10 degree conditions due to an equipment malfunction while they were servicing a remote snow site. Fortunately, they were rescued the next day and everyone was OK. Lucas was not part of that mission, but he heard their story and is keenly aware of the need for preparedness and safety in his position.

“Snow school has been very beneficial. I've learned things I haven't thought about before and I'm going to make some changes to my gear and replace some things based on what I've learned here,” Lucas said. “We fly by helicopter to most of our sites, so we would use this kind of training anytime a helicopter breaks down.”

“I'm grateful to NRCS to be a part of the training. It's really helpful that they invite cooperators here,” he added.

For more information on the NRCS Snow Survey and Water Supply Forecasting Program, and to find current snowpack conditions and streamflow forecasts for your area, visit the NWCC website at:

www.wcc.nrcs.usda.gov



Eric Larson (front) builds a snow shelter at Westwide Snow Survey Training in West Yellowstone, Montana.



Dr. Michael Strobel (far right), director of the NRCS National Water and Climate Center, shows students how to create a makeshift splint during a mountain medicine class at Westwide Snow Survey Training.



**2018 Westwide Snow Survey Training School
West Yellowstone, Montana**



Portland hosts SnowPAC Annual Workshop 2017

The Snow Program Advisory Committee (SnowPAC) is a team of state data collection officers, water supply specialists and National Water and Climate Center (NWCC) staff.

The team meets monthly via teleconference to resolve issues and share information as it relates to the Snow Survey and Water Supply Forecasting (SSWSF) Program.

The team also strives to meet annually for a series of discussions aimed at improving the Program.

This year's workshop was held in Portland, Oregon, the week of December 4-7, 2017.

Participants from the 12 western states, including Alaska, gathered to share ideas and engage in problem-solving during the four-day workshop.

The workshop got underway with National Water and Climate Center Director and Snow Survey Program Manager **Mike Strobel** providing an update on the program current

budget, followed by a discussion of possible funding opportunities in the future.

Water and Climate Monitoring team lead **Deb Harms** led a discussion of her team's activities, including the creation of a new working group to update standards and specifications.

John Weeks, lead technician at the Electronics Maintenance Facility (EMF) then provided a report on the new, solid state Master Station equipment. John also discussed the status of the RFP for new pressure transducers.

Monday's session ended with a presentation from statistical assistant **Peter Briggs** on a proposed inventory system for EMF.

The Tuesday session kicked off with **Cara McCarthy**, Water and Services team lead, and **Gus Goodbody**, lead forecast hydrologist, giving a status report on program initiatives, including the Precipitation Runoff Modeling System (PRMS) and Basin Analysis GIS (BAGIS) tools.

Rashawn Tama, Management Analyst and IT team lead, provided an overview of the Enterprise Content Management (ECM) project, and status of the migration of applications to the National Information Technology Center (NITC).

At the 2016 SnowPAC workshop, several "working groups" were formed to address a broad range of topics.

The Tuesday afternoon sessions were devoted to updates and recommendations from the group leaders:

- * SWE Working Group (**Daniel Fisher**)
- * Forecast Verification Working Group (**Jeff Anderson**)
- * Telemetry Working Group (**Melissa Webb**)
- * Historical Temperature Data Bias Working Group (**Brian Domonkos**)
- * Air Temperature Sensor Working Group (**Lucas Zukiewicz**)

Wednesday's session focused on presentations from each western state on their current activities and accomplishments. An afternoon roundtable discussion was devoted to ways to improve communication both inside and outside the program.

The final day of the workshop included a discussion on pooling resources to achieve purchasing efficiencies, led by Oregon DCO supervisor, **Scott Oviatt**.

Rashawn Tama then provided an update on the ongoing effort to replace the Data Management Platform (DMP) editor application.

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Some of the attendees at the 2017 SnowPAC Annual Workshop.

Study finds snowpack decline across the West

A recent study from Oregon State University (OSU) and the University of California, Los Angeles (UCLA) shows declining snowpack across the American West over the last 60 years.

According to Phil Mote, director of the Oregon Climate Change Research Institute at OSU, the study found drops in snow measurements at over 90% of the snow monitoring sites which have been reporting since 1955.



Models show that the average snowpack in the region dropped between 15-30% since 1915.

The study, published in *NPJ Climate and Atmospheric Science*, and was a follow-on to a similar study completed by the researchers in 2005.

Mote reported that the new analysis found the loss of snowpack has accelerated.

"It's a bigger decline than we expected," he said. "In many lower-elevation sites, what used to fall as snow is now rain. Upper elevations have not been affected nearly as much, but most states don't have that much area at 7,000-plus feet."

Mote added that the amount of water stored in the region's snowpack is approximately the same as all the water stored in the region's reservoirs.

The study found California had the most gains in snowpack since 1955. However, recent droughts erased those gains and caused the snowpack to fall in many locations.

Eastern Oregon and northern Nevada saw the most decreases in snowpack over the span of the study.

Individual sites in California, Montana, Idaho, Washington

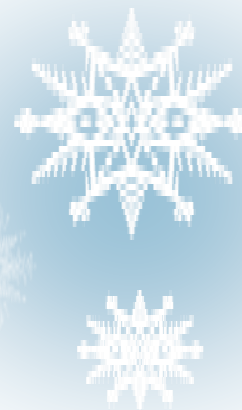
and Arizona saw snowpack declines of more than 70%.

Mote said it's not snowing less, but that the snow is melting sooner in the season at higher elevations, leading to low levels in river and reservoir levels during the driest days of summer and early fall.

The study focused on data from 1,766 snowpack monitoring sites across the West, most of them measured by the National Water and Climate Center's Snow Survey and Water Supply Forecasting Program and the California Department of Water Resources.

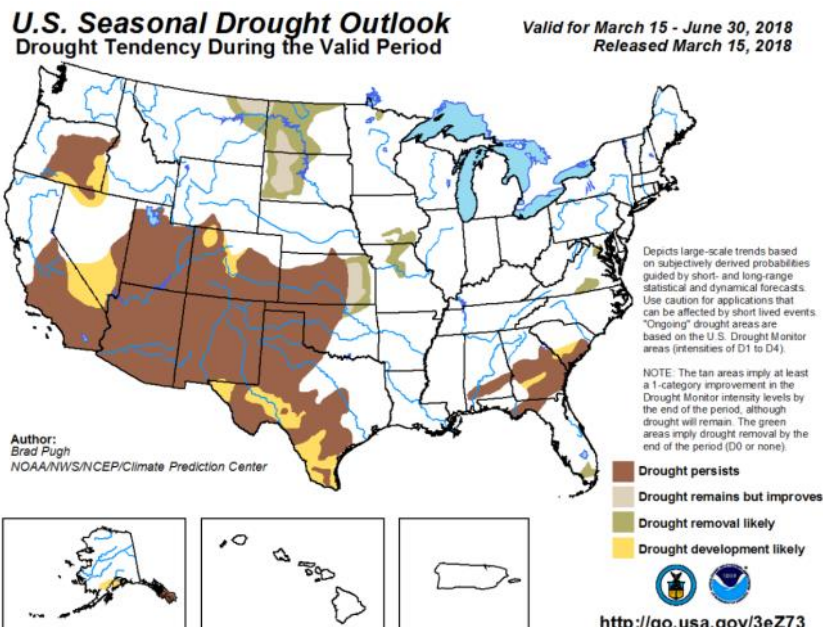
Researchers used snow measurements taken on April 1, which is typically the high point for snowpack, but also looked at measurements taken in January, February, March and May.

Click [here](#) to see the complete study from *NPJ Climate and Atmospheric Science*.



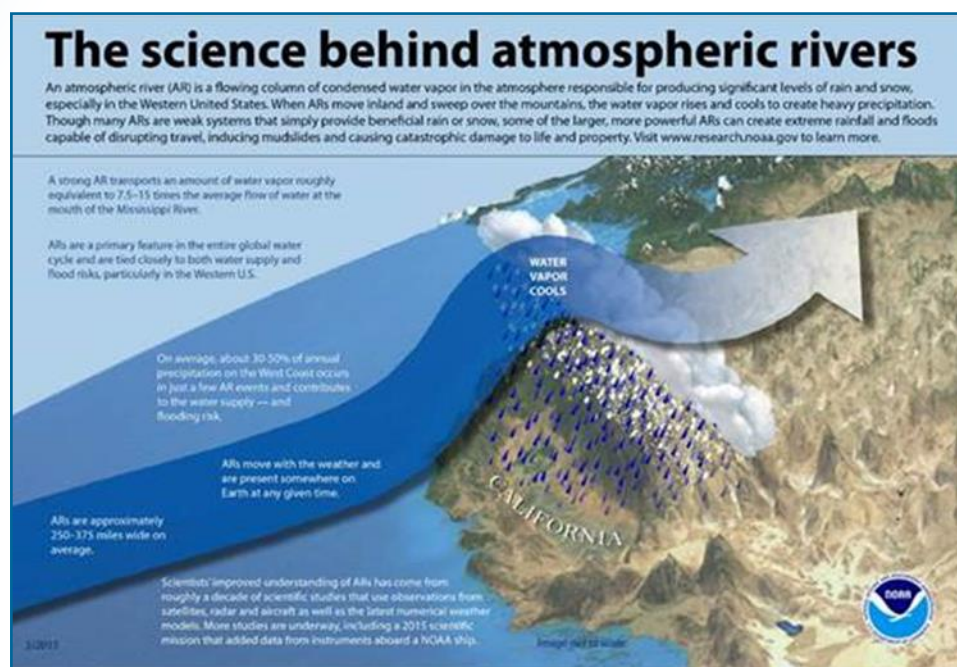
Climate Prediction Center 3-Month Drought Outlook

The NOAA Climate Prediction Center 3-month U.S. Seasonal Drought Outlook for spring 2018 shows drought conditions persisting throughout the Southwest, with drought development likely in portions of southern Oregon, Nevada, and Texas. Drought conditions are improving in the western parts of North and South Dakota and northeast Montana.



Story map: Atmospheric rivers and their impacts

A new story map from the National Oceanic and Atmospheric Administration (NOAA) showcases research on atmospheric rivers and their impacts. "The NOAA Climate Program Office's Sectoral Applications Research Program (SARP) created a story map to describe how NOAA research is trying to better understand atmospheric rivers, their impacts on communities, and forecast them." <http://cpo.noaa.gov/News/News-Article/ArtMID/6226/ArticleID/1562/New-Story-Map-showcases-NOAA-Research-on-atmospheric-rivers-and-their-impacts>



Web Picks of the Month

Climate Central

[Climate Central](#) is "an independent organization of leading scientists and journalists researching and reporting the facts about our changing climate and its impact on the public." The organization conducts surveys, performs research, and informs the public on key findings related to climate change.

The Climate Central website delivers peer-reviewed research publications, a gallery of maps and graphics, a library of videos, and other information on the science and impacts of climate change.

AASC Climate Services Catalog

The American Association of State Climatologists (AASC) has developed a [catalog of online, climate-related services](#) provided by its members. Services provided by state climate offices are the primary focus. In addition, online climate tools offered by other membership and partners including the regional climate centers, National Climatic Data Center (NCDC), and other NOAA agencies are provided.

Geospatial Data Gateway

The USDA [Geospatial Data Gateway](#) (GDG) provides ac-

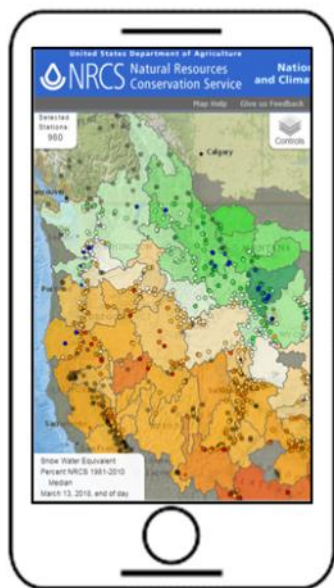
cess to a map library of more than 100 high-resolution vector and raster layers in the Geospatial Data Warehouse.

It is a great source of environmental and natural resources data, provided to users at any time, from anywhere.

Users can choose their area of interest, browse and select data, customize the format, and then review and download maps.

This service is made available through a close partnership between the three Service Center Agencies: the Natural Resources Conservation Service ([NRCS](#)), Farm Service Agency ([FSA](#)) and Rural Development ([RD](#)).

Interactive map now optimized for mobile devices



Interactive map showing station and basin snow water equivalent (SWE) conditions on a mobile phone.

The newest version of the National Water and Climate Center's [Interactive Map](#) now supports mobile devices. This version has all the features of the popular interactive map, optimized for smartphones and tablets. Click [here](#) for a quick overview of the new mobile map controls

NWCC attends planning conference

In March, Cara McCarthy attended an Interstate Council on Water Policy (ICWP) Western States Water Council (WSWC) Water Planners' Conference and Roundtable Meeting in Washington, D.C. It was a joint meeting between the WSWC (which is focused on western states) and the ICWP (which is spread across the entire country).

The first day of the meeting consisted of presentations organized by topic concerns (Cara presented here). The next day were agency (DOI, COE, NOAA, USDA, NASA) roundtable discussions with agency leads. Non-federal participants then met with key House and Senate committee staff.

In addition, the Western States Federal Agency Support Team (WestFAST) held a joint meeting with the WSWC on the third day and had a stand-alone meeting as well. Mike is a principal member of WestFAST; with Cara acting as his representative at the meeting.

Upcoming events

Events of interest in the coming months.



What: NWCC Field Operations Workshop

When: April 9-13, 2018

Where: Boise, ID

More Information: [John Weeks](#), 503-820-5740

What: 86th Annual Western Snow Conference

When: April 17-20, 2018

Where: Albuquerque, NM

More information: [Conference Overview](#)

What: 10th International Conference on Climate Change: Impacts & Responses.

When: April 20-21, 2018

Where: University of California at Berkeley

More information: [Conference Website](#)

What: 75th Eastern Snow Conference

When: June 5-8, 2018

Where: College Park, MD

More Information: [Conference Website](#)

What: American Association of State Climatologists Annual Meeting

When: June 19-22, 2018

Where: Nebraska City, NE

More Information: [Meeting Website](#)

What: Global Climate Action Summit

When: September 12-14, 2018

Where: San Francisco, CA

More information: [Summit Website](#)

What: 9th Annual Northwest Climate Conference

When: October 9-11, 2018

Where: Boise, ID

More Information: [Conference Website](#)

What: American Meteorological Society Annual Meeting

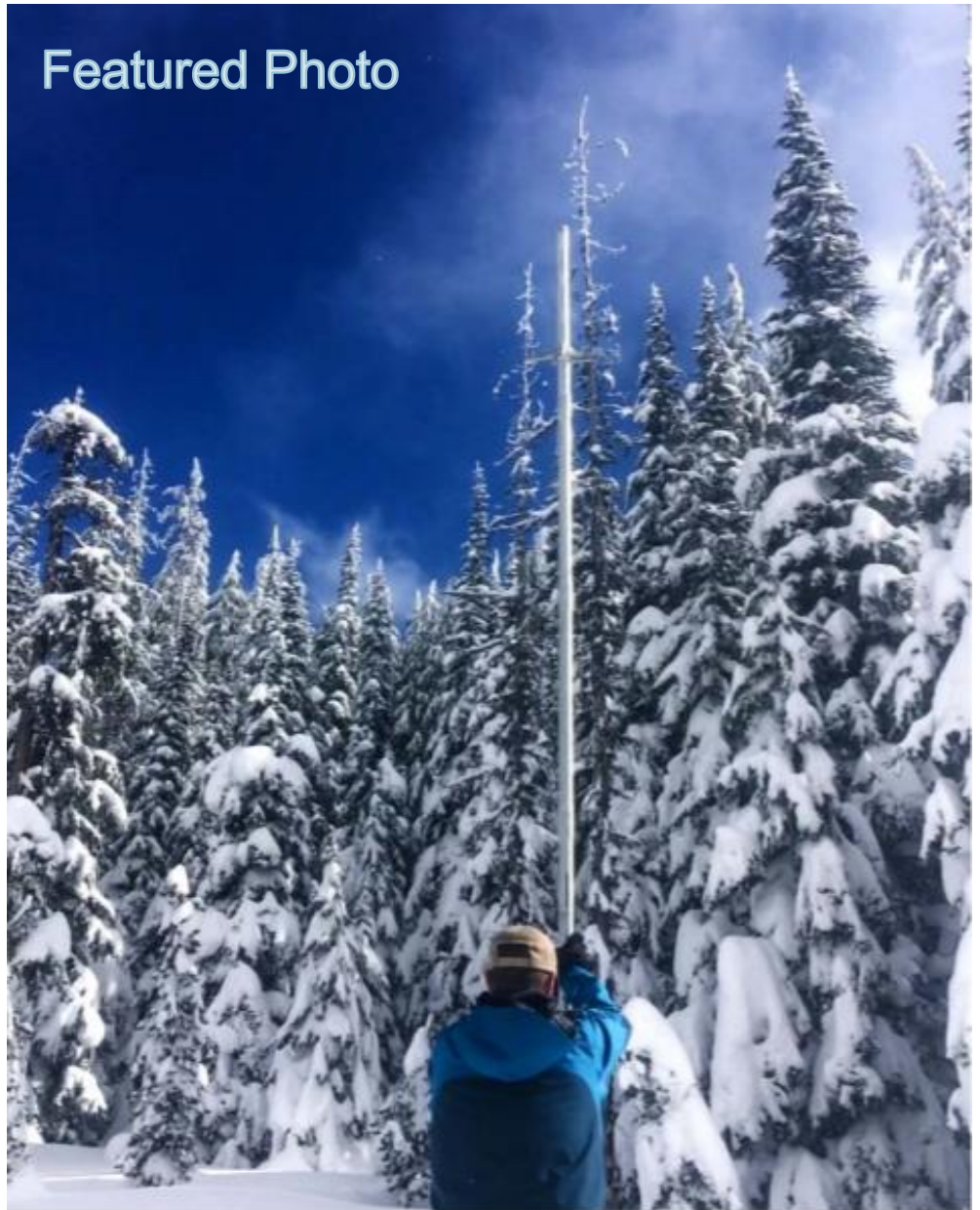
When: January 6-10, 2019

Where: Phoenix, AZ

More Information: [Meeting Website](#)



Featured Photo



Surveyor Kurt Moffitt measures new-fallen snow near Mt. Bachelor, Oregon. Photo courtesy: Gabriella Coughlin (NRCS Redmond)

2017 SnowPAC Annual Workshop

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Chris Romero, New Mexico Water Supply Specialist, presented information on the next Western Snow Conference, scheduled to be held April 16-19, 2018, in Albuquerque, New Mexico.

Next on the agenda was a wide-ranging discussion of the future of the water supply forecasting function and states'

role in that function, led by Cara McCarthy and Lucas Zukiewicz.

Lucas then led a discussion on site sensor selection to support future modeling efforts.

Thursday morning concluded with a discussion, led by Mike Strobel, on the Snow Survey program's organization, including the pros and cons of a potential reorganization.

The final afternoon of the workshop was devoted to discussing the future of the Soil Climate Analysis (SCAN) project.

Karl Wetlaufer, Colorado DCO assistant supervisor, also demonstrated the new interactive map export feature currently under development.

Snow Survey and Water Supply Forecasting Program

Resource Locator

Here's a handy reference for finding resources in the Snow Survey and Water Supply Forecasting Program.

Where	What	Who	How
Alaska	Forecast Hydrologist	Jolyne Lea 503-414-3040	jolyne.lea@por.usda.gov
	Data Collection Office Supervisor	Daniel Fisher 907-671-7746	daniel.fisher@ak.usda.gov
Arizona	Forecast Hydrologist	Jolyne Lea 503-414-3040	jolyne.lea@por.usda.gov
	Water Supply Specialist	Travis Kolling 602-280-8834	travis.kolling@az.usda.gov
California	Forecast Hydrologist	Jolyne Lea 503-414-3040	jolyne.lea@por.usda.gov
	Water Supply Specialist	Greg Norris 530-792-5609	greg.norris@ca.usda.gov
Colorado	Forecast Hydrologist	Cara McCarthy 503-414-3088	cara.s.mccarthy@por.usda.gov
	Hydrologist	Karl Wetlaufer 720-544-2853	karl.wetlaufer@co.usda.gov
	Data Collection Office Supervisor	Brian Domonkos 720-544-2852	brian.domonkos@co.usda.gov
Idaho	Data Collection Officer (acting)	Dan Tappa 208-378-5740	daniel.tappa@id.usda.gov
	Forecast Hydrologist	Rashawn Tama 503-414-3010	rashawn.tama@por.usda.gov
	Water Supply Specialist	Ron Abramovich 208-378-5741	ron.abramovich@id.usda.gov
Montana	Data Collection Office Supervisor	Mage Hultstrand 406-587-6844	mage.hultstrand@mt.usda.gov
	Forecast Hydrologist	Cara McCarthy 503-414-3088	cara.s.mccarthy@por.usda.gov
	Water Supply Specialist	Lucas Zukiewicz 406-587-6843	lucas.zukiewicz@mt.usda.gov
Nevada	Forecast Hydrologist	Jolyne Lea 503-414-3040	jolyne.lea@por.usda.gov
	Water Supply Specialist	Jeff Anderson 775-857-8500 x152	jeff.anderson@nv.usda.gov
New Mexico	Forecast Hydrologist	Gus Goodbody 503-414-3033	angus.goodbody@por.usda.gov
	Water Supply Specialist	Chris Romero 520-292-2999 x107	chris.romero@nm.usda.gov
Oregon	Forecast Hydrologist	David Garen 503-414-3021	david.garen@por.usda.gov
	Hydrologist	Melissa Webb 503-414-3270	melissa.webb@or.usda.gov
	Data Collection Office Supervisor	Scott Oviatt 503-414-3271	scott.oviatt@or.usda.gov
Utah	Forecast Hydrologist	Gus Goodbody 503-414-3033	angus.goodbody@por.usda.gov
	Snow Survey Supervisor (acting)	Troy Brosten 385-285-3114	troy.brosten@ut.usda.gov
Washington	Forecast Hydrologist	Gus Goodbody 503-414-3033	angus.goodbody@por.usda.gov
	Water Supply Specialist	Scott Pattee 360-428-7684	scott.pattee@wa.usda.gov
Wyoming	Forecast Hydrologist	Cara McCarthy 503-414-3088	cara.s.mccarthy@por.usda.gov
	Water Supply Specialist	Ken Von Buettner 307-233-6743	ken.vonbuettner@wy.usda.gov
All States	Center Director/Program Manager	Mike Strobel 503-414-3055	michael.strobel@por.usda.gov
	Management Analyst/IT Program Lead	Rashawn Tama 503-414-3010	rashawn.tama@por.usda.gov
	Water & Climate Monitoring Team Lead	Deb Harms 503-414-3050	deb.harms@por.usda.gov
	Water & Climate Services Team Lead	Cara McCarthy 503-414-3088	cara.s.mccarthy@por.usda.gov
	Administrative Assistant	Jo Huelshoff 503-414-3031	jo.huelshoff@por.usda.gov
	Database Manager	Maggie Dunklee 503-414-3049	maggie.dunklee@por.usda.gov
	Database Manager	Vacant	
	Development Hydrologist	David Garen 503-414-3021	david.garen@por.usda.gov
	Electronics Technician Lead (EMF)	John Weeks	john.weeks@por.usda.gov
	Electronics Technician (EMF)	Alex Rebentisch	alexander.rebentisch@por.usda.gov
	Hydrologist (Water & Climate Monitoring)	Chris Brown 503-414-3090	chris.r.brown@por.usda.gov
	Operations Specialist (SNOTEL/SCAN)	Vacant	
	Resource Conservationist	Vacant	
	Statistical Assistant/SCAN QC	Peter Briggs 503-414-3061	peter.briggs@por.usda.gov

Contact Help Center

There's an online tool to help locate resources within the Snow Survey and Water Supply Forecasting Program.

Click [here](#) to open the **Contact Help Center**. Don't forget to bookmark the url.



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Natural Resources Conservation Service
U.S. Department of Agriculture
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[www.wcc.nrcs.usda.gov/SnowNews/
SnowNews_landing.htm](http://www.wcc.nrcs.usda.gov/SnowNews/SnowNews_landing.htm)

Helping People Help the Land.

Our mission is: *"To lead the development and transfer of water and climate information and technology which support natural resource conservation."*



With a vision of the future as:

"A globally-recognized source for a top quality spatial snow, water, climate, and hydrologic network of information and technology."

Director's Corner: Our Greatest Asset, Our People



Our greatest asset:
Our people.

The lead article in this issue of **SnowNews** is about our annual Westwide Snow Survey Training, held in West Yellowstone, Montana, in March. We hold this training every winter and require our NRCS snow surveyors to take the course every three-to-five years in order to stay current on safety issues, sampling techniques, and other skills.

The reason we hold the course is to help ensure the safety and welfare of our greatest asset, our people. We not only want to do the best science possible, but we also want to make sure everyone is aware of potential hazards, knows how to handle difficult situations, and returns home after each field excursion in the safest manner.

Going beyond snow school, the same principles and standards

apply to all of our agency.

These are tough times, with staffing shortfalls, many changes in our organizational structure, large number of retirements, and working with Continuing Resolutions.

Through all the change and uncertainty, the shining light really is our people. We continue to ask individuals to take on more and more work, and that workload and stress has an impact on our people. But it is in the nature of those who choose to be public servants that we just can't say "no" when it comes to serving the public. So often, we stretch beyond our limits in what we can reasonably provide as products and services, just because we know people value what we do and need the products we deliver.

Everything has a limit, and we have had to start looking at what we can realistically provide to the public and how to deliver the best customer service with the remaining staff we have. This came out recently with our announcement of the possible discontinuation of certain map products that are highly popular but will become difficult to produce in the near future due to IT support and vacancies at our Center. Our

hydrologists and natural resources specialists may be able to support our customers more effectively by focusing on advancing the state of the science and prioritizing our conservation technical assistance, instead of trying to learn and troubleshoot technical software issues that are beyond the scope of their expertise and training. Such decisions are extremely difficult to make because so many people rely on these products, as the outpouring of emails, calls and letters from across many agencies, universities and organizations indicates. Yet, we can only ask so much from the people we have on staff. We will continue to seek innovative and creative solutions to this and other issues related to staffing and will strive to deliver the best customer service possible.

As we move into the future, we are optimistic that we will both see increases in our staffing and in maintaining the products we presently serve to the public.

Our goal is to serve, but as a manager, I also must keep in mind the welfare of our greatest asset, our people, and just like snow school, make sure they can handle these difficult situations while ensuring their health and wellbeing. All things in life are a balance.

Mike



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